N And P-Channel Enhancement Mode MOSFET

Description

The NP4606SR-M uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge . The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.

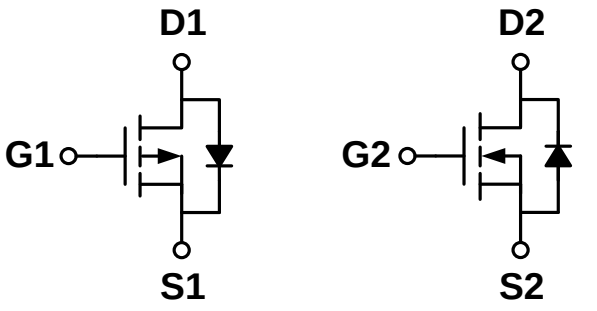
General Features

- **N-channel：**
  V_{DS} =30V，ID =6.9A
  $R_{DS(ON)}$=16.9mΩ (typical) @ VGS=10V
  $R_{DS(ON)}$=32.5mΩ (typical) @ VGS=4.5V
  P-Channel：
  V_{DS} =-30V，ID =-6A
  $R_{DS(ON)}$=24.9mΩ (typical) @ VGS=-10V
  $R_{DS(ON)}$=32.6mΩ (typical) @ VGS=-4.5V
- Excellent gate charge x $R_{DS(ON)}$ product(FOM)
- Very low on-resistance $R_{DS(ON)}$
- 150 °C operating temperature
- Pb-free lead plating
- 100% UIS tested

Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

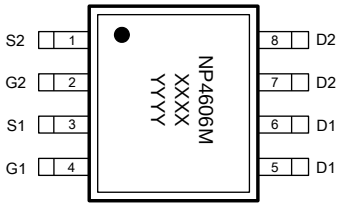
Schematic diagram



p-channel　　n-channel

Marking and pin assignment

SOP-8
(TOP VIEW)



XXXX—Wafer Information
YYYY—Quality Code

Package

SOP-8

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP4606SR-M-G	-55°C to +150°C	SOP-8	4000

Absolute Maximum Ratings (TA=25℃ unless otherwise noted)

Parameter	Symbol	Limit		Unit
		N	P	
Drain-source voltage	V_{DS}	30	-30	V
Gate-source voltage	V_{GS}	±20	±20	V
Maximum power dissipation	P_D	2.0	2.0	W

Operating junction Temperature range		T_j	-55—150	-55—150	℃
Drain Current-Continuous (Silicon Limited)	T_A=25°C	I_D	6	-6	A
	T_A=75°C		5	-5	
Pulsed Drain Current (Package Limited)		I_{DM}	30	-30	A
Avalanche Current C		I_{AS}, I_{AR}	10	23	A
Avalanche energy L=0.1mH C		E_{AS}, E_{AR}	5	26	mJ
Power Dissipation B	T_A=25°C	P_D	2	2	W
	T_A=75°C		1.3	1.3	
Junction and Storage Temperature Range		T_J, T_{STG}	-55—150		℃

N-Channel Electrical Characteristics (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	30	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=30V, V_{GS}=0V	-	-	1	μA
Gate-body leakage	I_{GSS}	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1.0	1.55	3.0	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=6A	-	16.9	22	mΩ
		V_{GS}=4.5V, I_D=5A	-	32.5	37	
Forward transconductance	gfs	V_{DS}=5V, I_D=6A	-	15	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	V_{DS}=15V ,V_{GS}=0V f=1.0MHz	-	430	-	pF
Output capacitance	C_{OSS}		-	63	-	
Reverse transfer capacitance	C_{RSS}		-	54	-	
Gate resistance	Rg	V_{GS}=0V, V_{DS}=0V, f=1.0MHz	-	3.3	4.9	Ω
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	V_{DS}=15V V_{GS}=10V R_L=2.5Ω R_{GEN}=3Ω	-	4.5	-	ns
Rise time	tr		-	2.5	-	
Turn-off delay time	$t_{D(OFF)}$		-	14.5	-	
Fall time	tf		-	3.5	-	
Total gate charge	Qg	V_{DS}=15V,I_D=6A V_{GS}=10V	-	9	-	nC
Gate-source charge	Qgs		-	2.7	-	
Gate-drain charge	Qgd		-	1.7	-	

Thermal Characteristics

Thermal Resistance junction-to ambient	Rth JA	100	℃/W

N-Channel: Typical Electrical And Thermal Characteristics

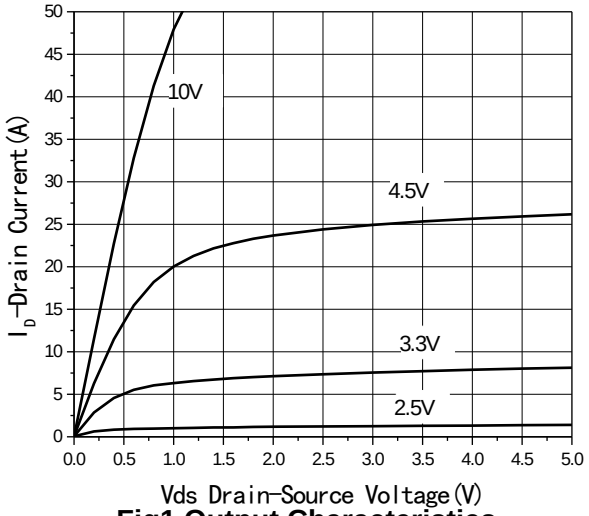


Fig1 Output Characteristics

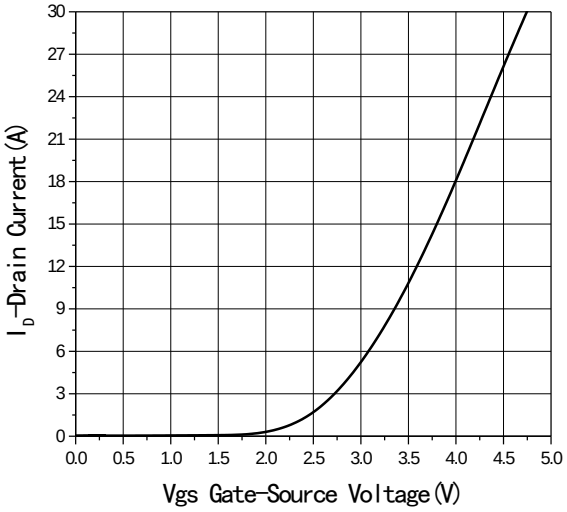


Fig2 Transfer Characteristics

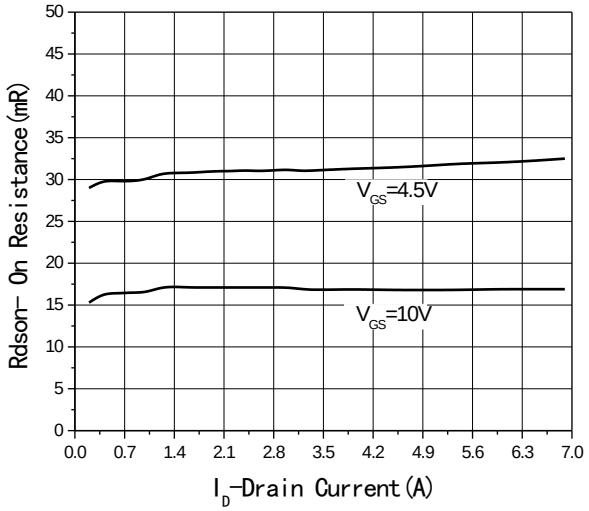


Fig3 Rdson-Drain current

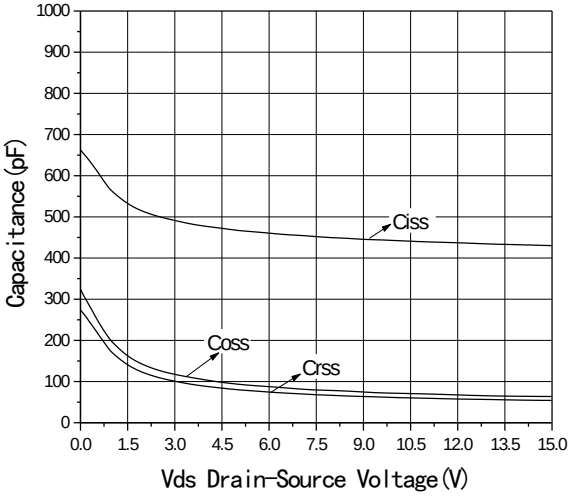


Fig4 Capacitance vs Vds

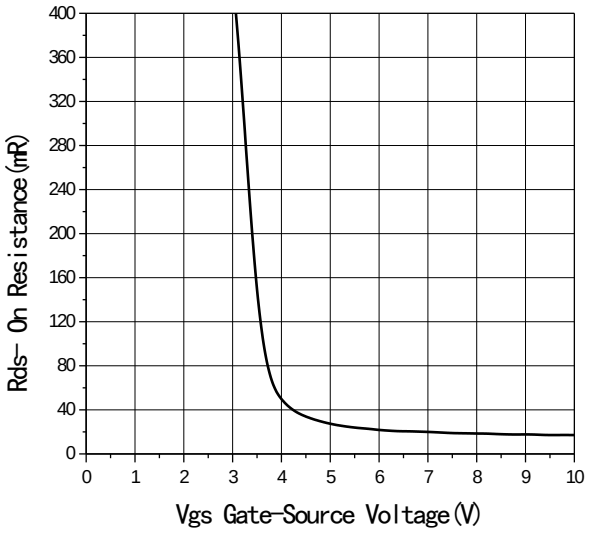


Fig5 Rdson-Gate Drain voltage

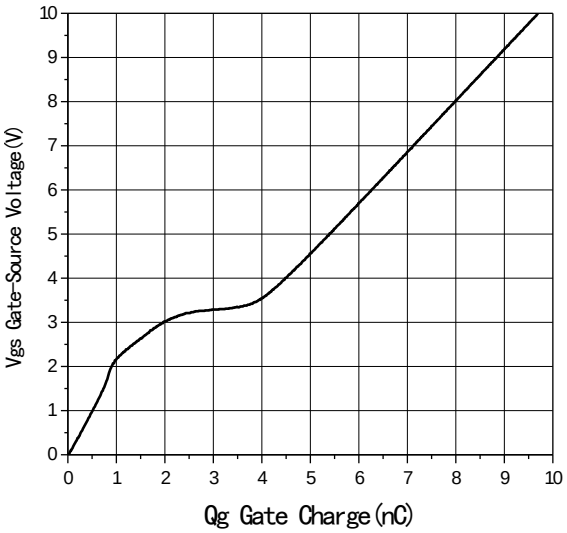


Fig6 Gate Charge

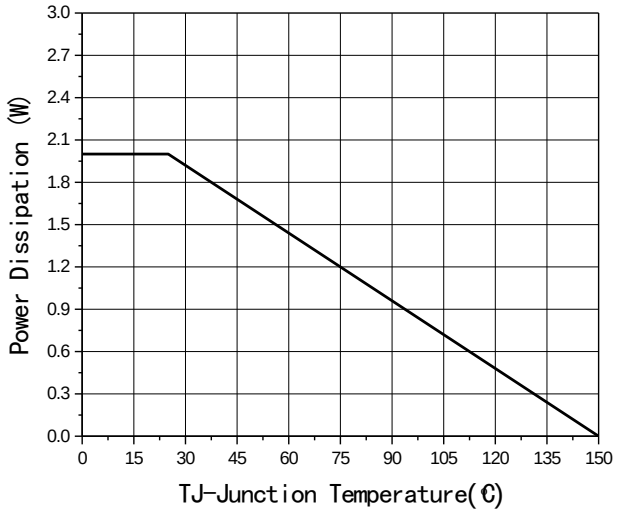


Fig7 Power De-rating

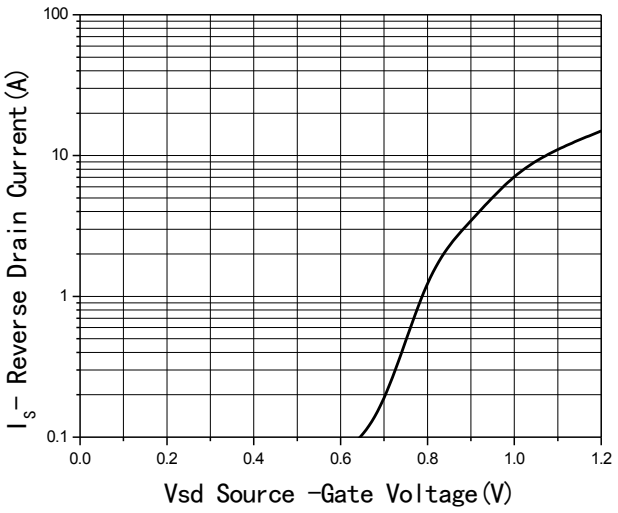


Fig8 Source-Drain Diode Forward

P-Channel Electrical Characteristics (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=-250μA	-30	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=-30V, V_{GS}=0V	-	-	-1	μA
Gate-body leakage	I_{GSS}	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-0.8	-1.32	-2	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-6A	-	24.9	35	mΩ
		V_{GS}=-4.5V, I_D=-5A	-	32.6	50	
Forward transconductance	gfs	V_{DS}=-5V, I_D=-6A	-	18	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	V_{DS}=-15V ,V_{GS}=0V f=1.0MHz	-	939	-	pF
Output capacitance	C_{OSS}		-	107	-	
Reverse transfer capacitance	C_{RSS}		-	90	-	
Gate resistance	Rg	V_{GS}=0V, V_{DS}=0V, f=1.0MHz	-	3.2	5	Ω
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	V_{DS}=-15V V_{GS}=-10V R_L=2.3Ω R_{GEN}=3Ω	-	8	-	ns
Rise time	tr		-	6	-	
Turn-off delay time	$t_{D(OFF)}$		-	17	-	
Fall time	tf		-	5	-	
Total gate charge	Qg	V_{DS}=-15V,I_D=-6A V_{GS}=-10V	-	19.2	-	nC
Gate-source charge	Qgs		-	2.7	-	
Gate-drain charge	Qgd		-	3.3	-	

P-Channel: Typical Electrical And Thermal Characteristics

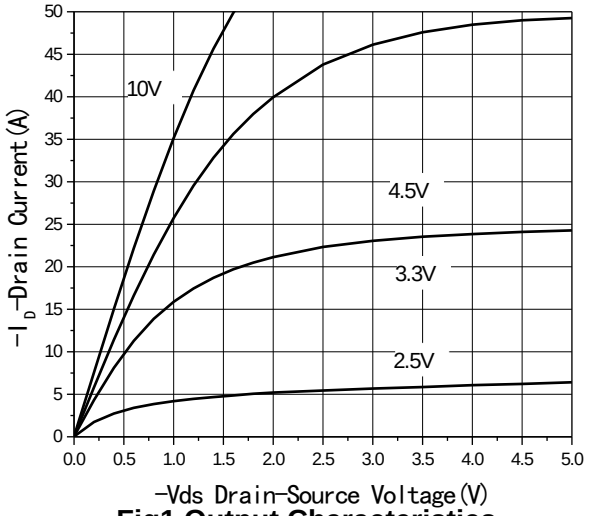


Fig1 Output Characteristics

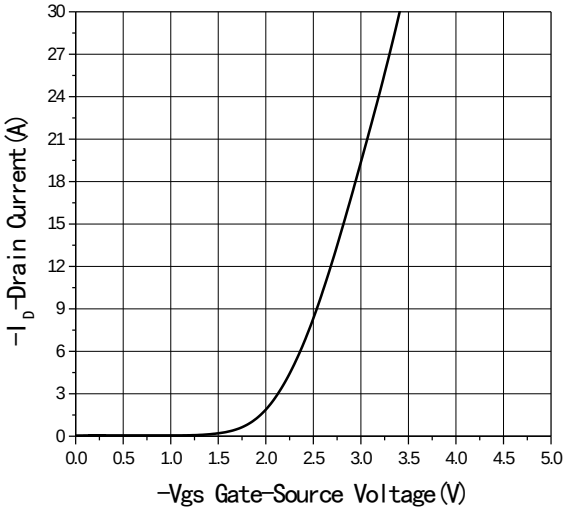


Fig2 Transfer Characteristics

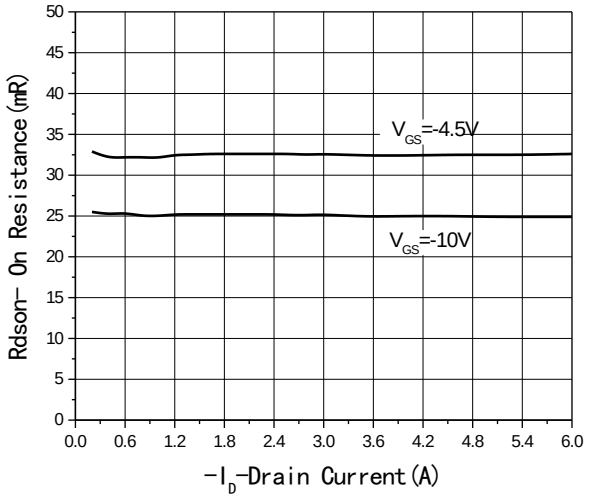


Fig3 Rdson-Drain current

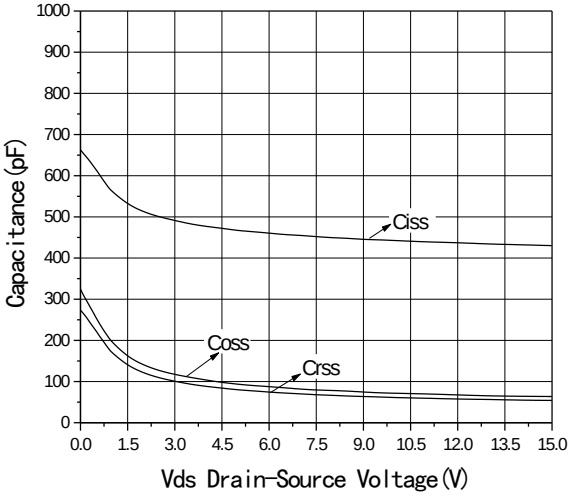


Fig4 Capacitance vs Vds

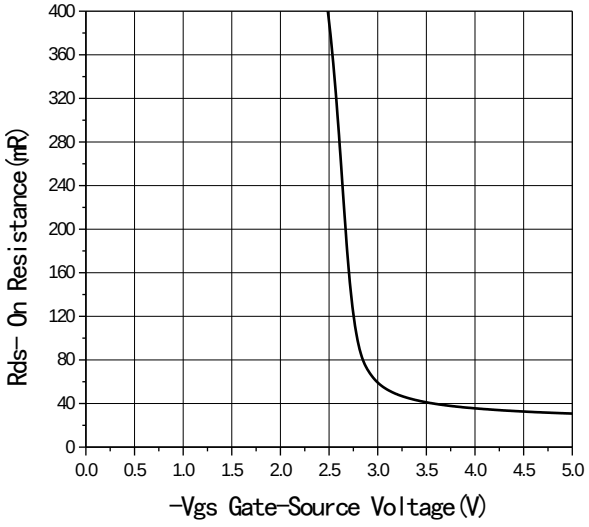


Fig5 Rdson-Gate Drain voltage

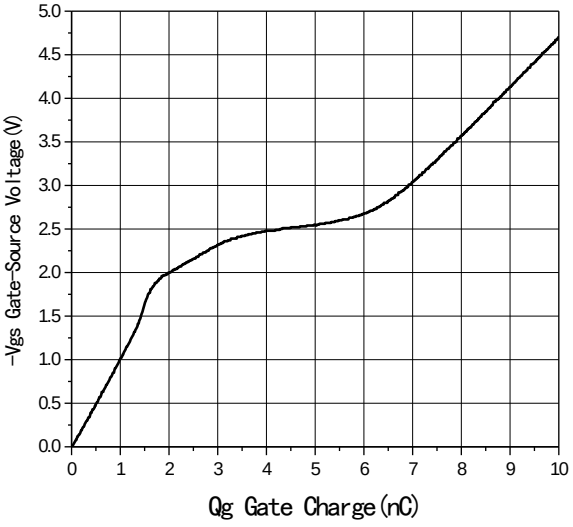


Fig6 Gate Charge

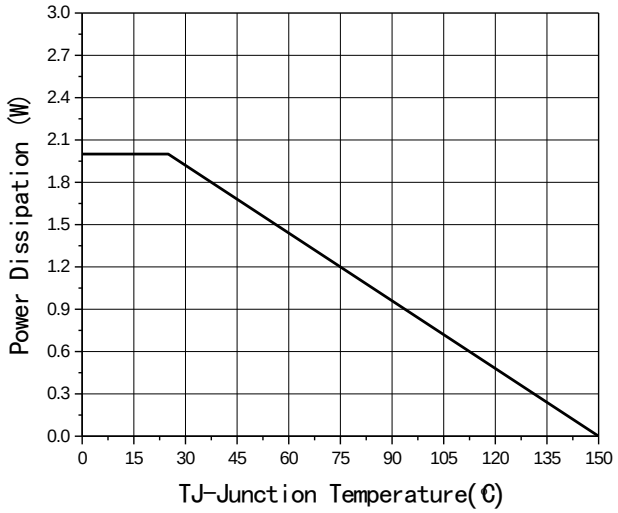


Fig7 Power De-rating

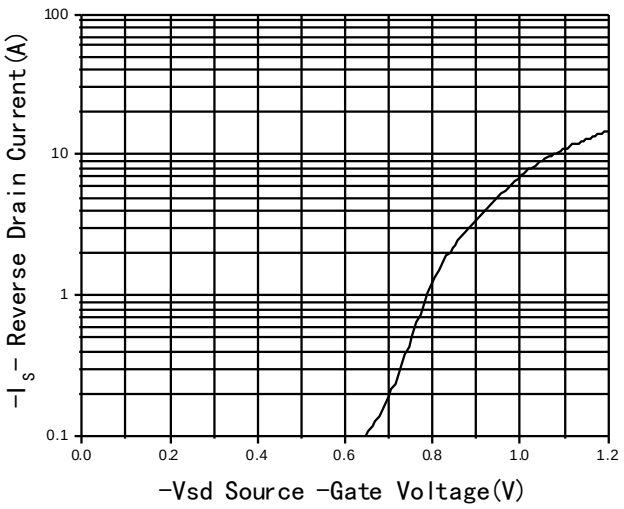
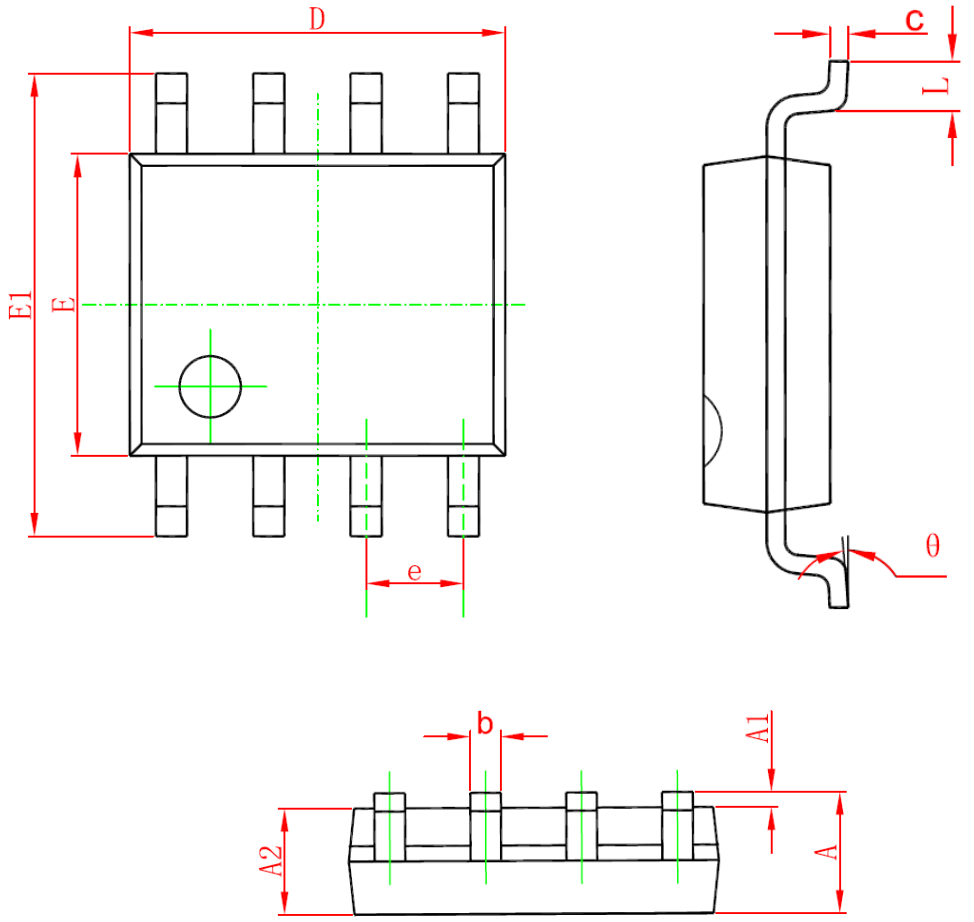


Fig8 Source-Drain Diode Forward

Package Information

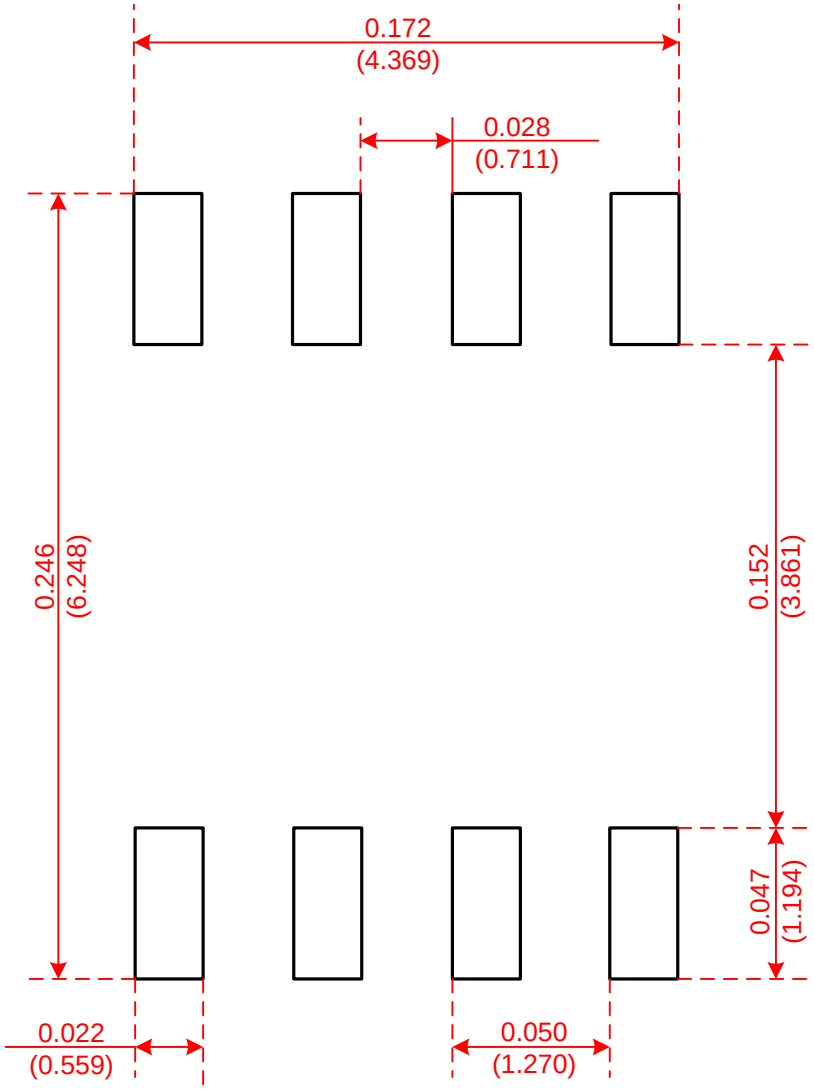
- **SOP-8**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Recommended Minimum Pads

- **SOP-8**



Recommended Minimum Pads
Dimensions in Inches/(mm)